

## 8. ATMOSPHERIC TIDES MIDDLE ATMOSPHERE PROGRAM (ATMAP)

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Atmospheric tides, oscillations in meteorological fields occurring at subharmonics of a solar or lunar day, comprise a major component of middle atmosphere global dynamics. The purpose of the 1982-1986 Atmospheric Tides Atmosphere Program (ATMAP) was to foster an interaction between experimentalists, data analysts, and theoreticians and modelers, in order to better understand the physical mechanisms governing tides and their relationships to other scales of motion, and to thereby explain features of observed tidal structures in the mesosphere and lower thermosphere. The ATMAP consisted of seven observational campaigns, five workshops and a climatological study. This paper provides a historical perspective and summary of major results, conclusions, and recommendations for future study which have emerged from the ATMAP.

**PURPOSE:** Create an interaction among experimentalists, data analysts, theoreticians, and modellers working towards the following goals:

- (1) Delineate the global morphology of middle middle atmosphere tides including temporal and spatial variability on various scales; and
- (2) Elucidate the relationships between tides and other scales of motion (zonal mean circulation, gravity waves, turbulence).

#### ATMAP PARTICIPANTS

S. Kato (Japan)	S. Avery (USA)
T. Aso	B. Balsley
T. Tsuda	S. Bowhill
S. Miyahara	D. Carter
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A. Manson (Canada)	P. Czechowsky
C. Meek	
	H. Teitelbaum (France)
C. Reddy (India)	F. Vial
	J. Fellous
G. Cevolani (Italy)	
G. Groves (UK)	

**HAMBURG WORKSHOP (1-day)**

Global Analyses - Campaigns I, II  
 Emphasis on Latitudinal Structures  
 Assessment of Numerical Models  
 Paucity of Low-Latitude data  
 Discussion on Data Analysis Techniques  
   Fourier fits, filtering, spectral analysis  
   weighting, variable data quality  
   Groves technique  
   minimum 4-day fit span  
   vector average vs. amplitude average

**KYOTO WORKSHOP (2-day)**

Global Analyses - Campaigns I, II, III, IV  
 Emphasis on Vertical Structures  
 Typical "High-Latitude" and "Middle-Latitude" Behaviors  
 Asymmetries Between Kyoto (35°N) and Adelaide (35°S)  
 Paucity of Low-Latitude Data  
 Discussion on Tidal 'Variability'  
   global (steady-state) vs. local (transient) oscillations  
   gravity-wave interactions  
   10-day determinations optimum for global consistency  
     without removing some real variations of global tides  
 Modelling Needs  
   hemispheric asymmetries in background winds/temps  
   seasonal-latitudinal variations in dissipation  
   better seasonal coverage (month-by-month)

**PRAGUE WORKSHOP (1/2-day)**

June and December Climatologies  
 Kyoto/Adelaide Asymmetries with Groves bias removed  
 Existence of Interannual Variability Noted  
 Discussion on Global Coherence vs. fit span  
 Theoretical Relation -  $\Phi'/u', v'$   
   fit data with orthogonal functions  
   formulate l.b.c.'s for thermospheric models  
 Guidelines for Construction of Monthly Climatologies

**TOULOUSE INTERIM MEETING (1/2-day)**

Interim Comparison of Climatologies  
 Global Equinox Transition

**VANCOUVER WORKSHOP (1/2-day)**

Comparative Analyses of Station Climatologies  
 Seasonal-Latitudinal Trends in Vertical Structure  
 Pre-Helsinki Organization

## ATMAP CALENDAR

Campaign I	09 NOV 81 - 03 DEC 81 (Core: 19-22 NOV 81)
Campaign II	02 MAY 82 - 08 MAY 82 (Core: 03-06 MAY 82)
ATMAP Workshop IAMAP, Hamburg, FRG	17 AUG 82
Campaign III	21 NOV 83 - 16 DEC 83 (Core: 06-09 DEC 83)
Campaign IV	15 MAR 84 - 15 APR 84 (Core: 28-31 MAR 84)
Campaign V	01 JUN 84 - 30 JUN 84 (Core 1: 12-15 JUN 84)
Global Thermosphere Mapping Study (GTMS)	(Core 2: 26-28 JUN 84)
Campaign VI	15 SEP 84 - 15 OCT 84
ATMAP Workshop MAP Symposium, Kyoto	05,06 DEC 84
Global Thermosphere Mapping Study (GTMS)	15-17 JAN 85
ATMAP Workshop IAMAP, Prague	14 AUG 85
Interim Meeting COSPAR, Toulouse	6 JUL 86
ATMAP Workshop IAMAP, Vancouver	21 AUG 87
ATMAP Session MAP Symposium COSPAR, Helsinki	22 JUL 88